2. Existing Domestic Wastewater Treatment Plant

This Section provides a background review of the DWTP's existing facilities, current process train, method of operation, discharge practices, and potential deficiencies in treatment and discharge capacity.

2.1. Existing Treatment Plant History

The DWTP was originally built in 1979 and became operational shortly thereafter in 1980. At the time, the DWTP consisted of influent screening, aerated facultative primary ponds (Ponds 1A and 1B), a shallow high-rate secondary pond (Pond 2), two algae settling ponds (Ponds 3A and 3B), and approximately 1.6 acres of percolation beds located to the east of the treatment ponds. The original DWTP process schematic is shown in **Figure 2-1**.

The DWTP was originally an Advanced Integrated Pond System (AIPS). The AIPS uses microorganisms to convert soluble BOD in the wastewater into settleable biomass. For this biological conversion to occur there must be a readily-available supply of oxygen to sustain and promote biomass respiration. Unlike conventional WWTPs, which use mechanical means to supply oxygen, the AIPS relies on oxygen produced by algae within its ponds, namely Pond 2. The goal is to cultivate sufficient algae to provide a low-cost supply of oxygen. Once sufficient BOD has been converted, the algae are separated from the wastewater through the final settling ponds (Ponds 3A and 3B) prior to discharge, per the original design intent.

Following the initial design, the DWTP underwent a series of improvements, which addressed various treatment and discharge deficiencies. In 1987, the City undertook a renovation project that added a new operations building and a new headworks equipped with an influent screen, comminutor, and flow measurement. Seven years later, the existing eastern percolation beds were renovated to improve discharge capacity that had diminished over the years. In 1996, additional discharge capacity was added in the DWTP Percolation Bed Expansion Project. This increased discharge capacity through the development of the western percolation beds. A site aerial of the DWTP after this latest improvement is shown in **Figure 2-2**. Settling algae in Ponds 3A and 3B proved problematic, and the City modified the flow path and operation of the DWTP several times over the years to improve effluent quality and reduce algae levels.

In late 2002, the City began a final series of capital and maintenance improvement projects to the existing DWTP. The first of these improvements began in late 2002, with the development of approximately 50 million gallons (MG) of emergency storage pond volume on the west side of the plant (**Figure 2-3**). In early 2003, the City started a biosolids removal project in Pond 1A as a maintenance effort to dispose of biosolids that had accumulated since the pond became operational in 1980.

2.2. Interim Improvements for the LTWMP

In 2003 the City also constructed interim improvements at the DWTP to provide short-term treatment improvements in plant performance until the LTWMP could be fully implemented. Specific objectives for these interim improvements included improving effluent quality, odor control, and flow measurement. These interim improvements introduced considerable changes to the treatment process by converting the original primary pond/AIPS system into a DPMC process

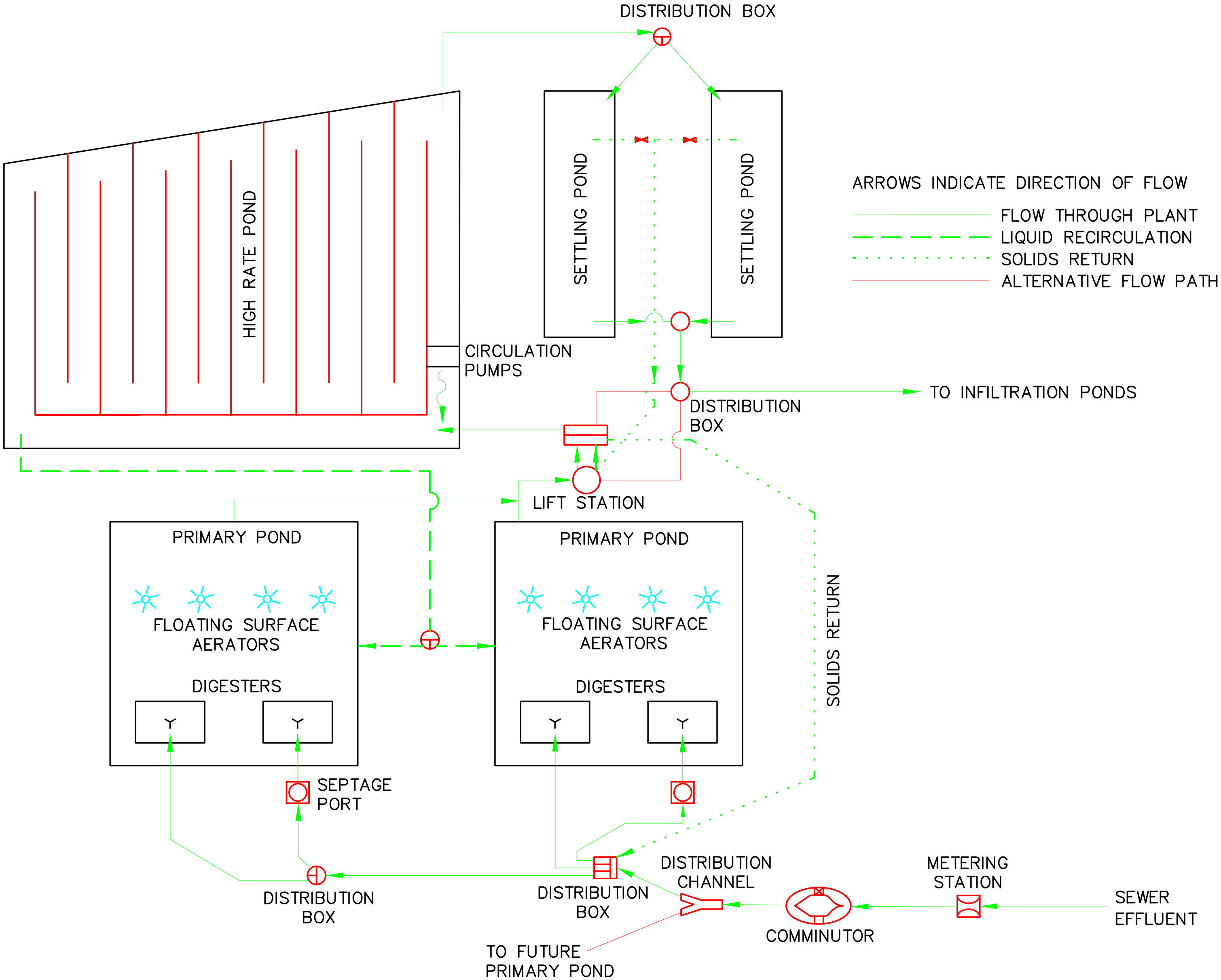

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Figure 2-1
City of Hollister Long-Term Wastewater Management Program
Original DWTP Process Flow Diagram

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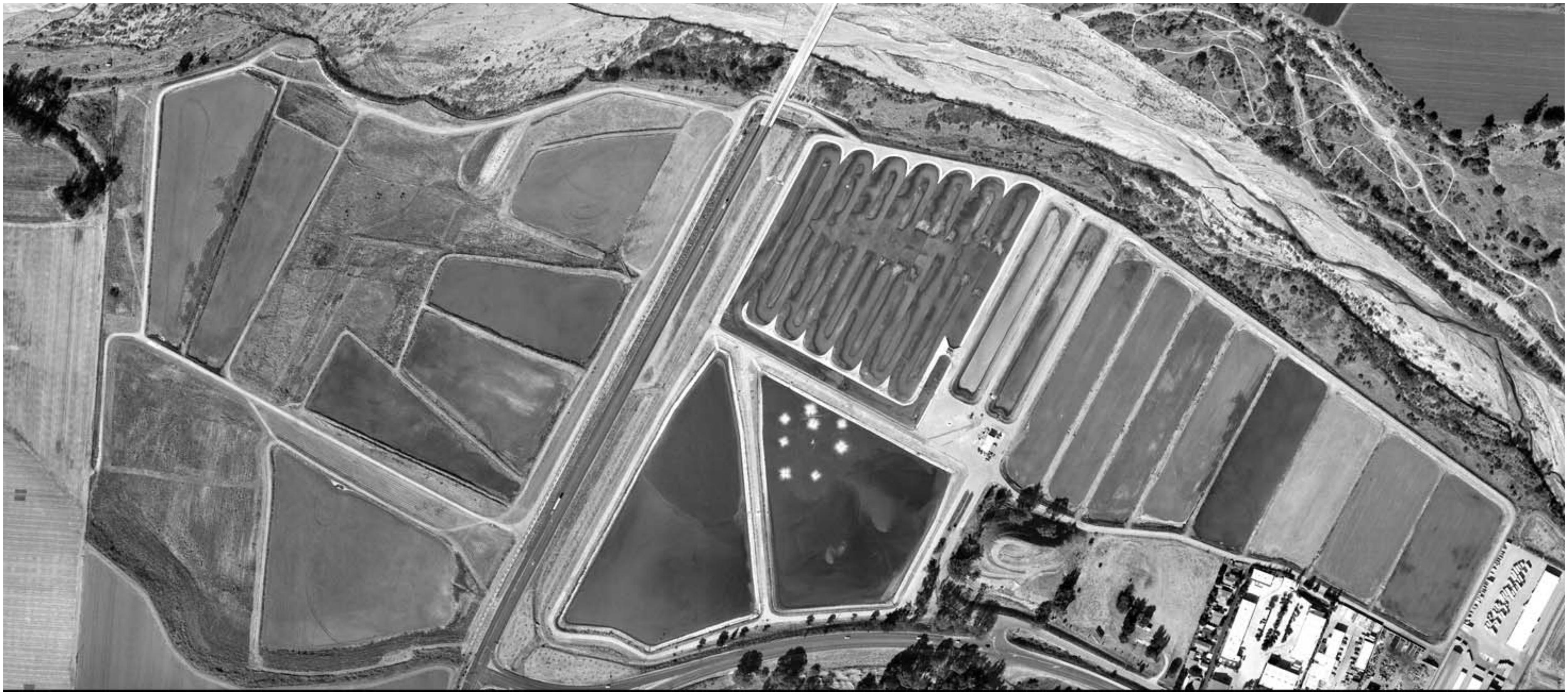

Figure 2-2
City of Hollister Long-Term Wastewater Management Program
DWTP Aerial

HydroScience Engineers, Inc.

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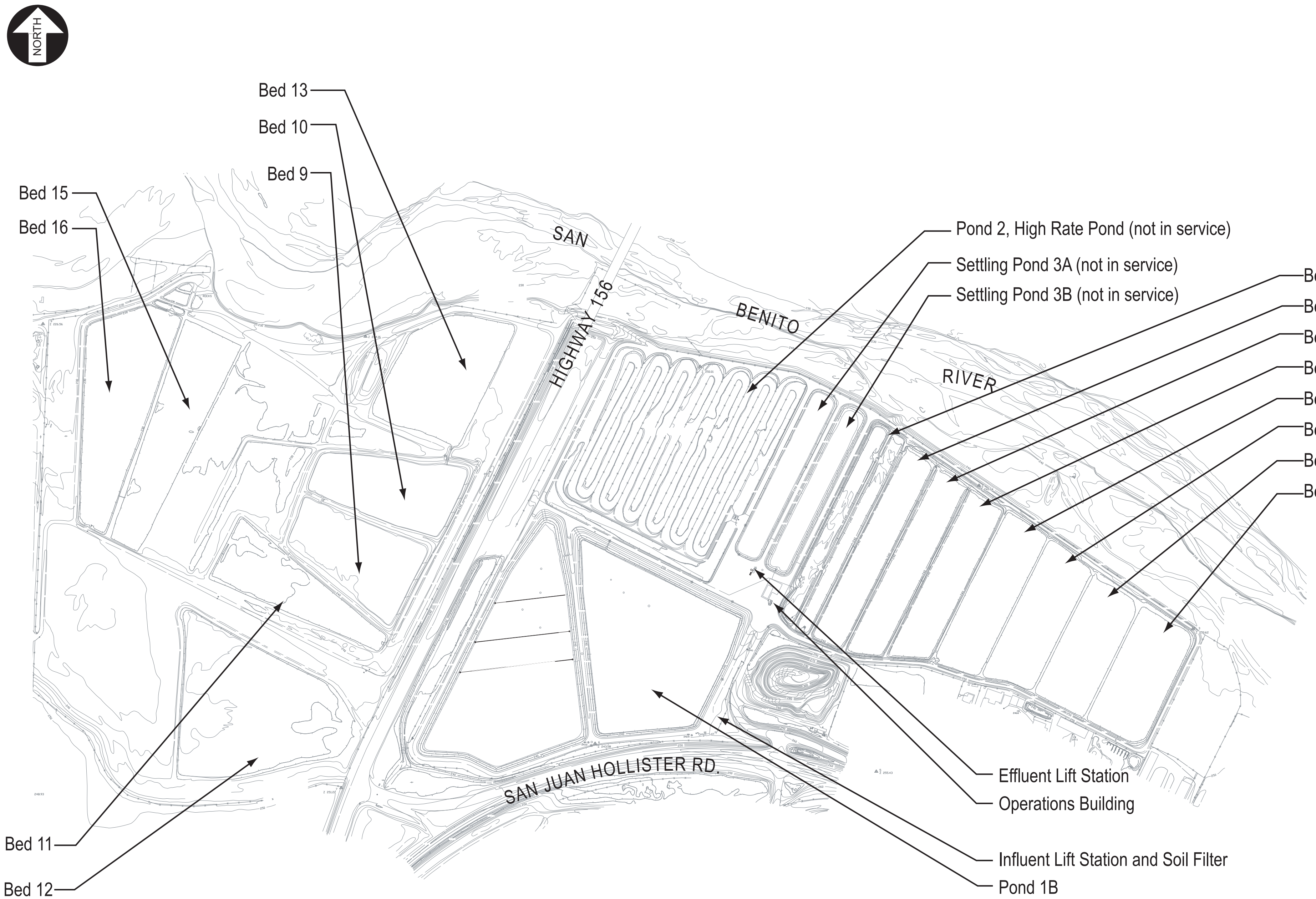

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HydroScience Engineers, Inc.

Figure 2-3
City of Hollister Long-Term Wastewater Management Program
Existing DWTP Site Plan

for improved BOD reduction and TSS control. The DPMC system is designed for the permitted 30-day average dry weather flow of 2.69 MGD. In addition to the secondary process changes, there were added improvements upstream of the DPMC. To control odors and improve flow measurement, a new influent lift station was constructed equipped with a mechanical grinder, an odor control biofilter, and magnetic flow meter. The headworks improvements were designed to be incorporated into the final LTWMP.

2.2.1. Phase 1: Headworks Upgrade

Phase 1 of the LTWMP was construction of a new headworks. The flow meter in the existing headworks at the DWTP was nonfunctional due to hydraulic constraints. Flow was measured in an open rectangular channel that also experienced periodic hydraulic constraints depending upon water levels in the DWTP ponds. Flow measurement was also relatively insensitive, and its accuracy was highly dependent upon water levels in the ponds. These problems were exacerbated by the lack of automatic screenings removal at the headworks. The headworks had an intermittently nonfunctioning comminutor and a manually cleaned bar rack which routinely backed up water behind it. The headworks was also a potential source of odors, and the City had received odor complaints for the DWTP.

The City constructed a new headworks on an accelerated schedule. The new headworks included a new grinder; influent wet well and pumps; and new influent flow meter. In addition, the City covered the new headworks and added a foul air biofilter for odor control. The new headworks was also designed to be integrated with any new WWTP design that the City chose to pursue and offered the City the following near-term benefits:

- Improved flow data
- Improved flow hydraulics
- Reduced odor emissions
- Demonstrated the City's commitment to improving wastewater treatment at the DWTP

This phase of the LTWMP was completed in the summer of 2003, and is currently in operation.

2.2.2. Phase 2: Interim Treatment Plant Process Design

The DWTP is currently permitted to treat 2.69 MGD average daily flow (ADF) of municipal-strength wastewater to secondary treatment standards utilizing a modified DPMC pond system. Major plant components, shown in **Figure 2-3**, currently in service include the influent lift station, odor control biofilter, DPMC pond, effluent lift station, and percolation beds for discharge. A general process flow diagram for current DWTP treatment is illustrated in **Figure 2-4**.

Domestic wastewater enters the DWTP through a 36-inch sanitary sewer line and into the newly constructed influent lift station, shown in plan and profile in **Figure 2-5 and Figure 2-6**, respectively. The raw wastewater then passes through a rail-mounted, mechanical grinder, intended to break up large solids, prior to entering the wet well. The raw wastewater is then pumped through a 16-inch magnetic flow meter for flow recording before continuing to the DPMC. To mitigate potential odors, foul air in the wet well air space is collected by a blower through foul air lines and applied to a compost based biofilter for odor control. From the influent pump station, the wastewater undergoes biological treatment through the DPMC system.

The DPMC system utilizes two types of basins for treatment: one complete-mix aeration basin and three partial-mix settling basins (**Figure 2-7**). The complete-mix basin is dedicated to

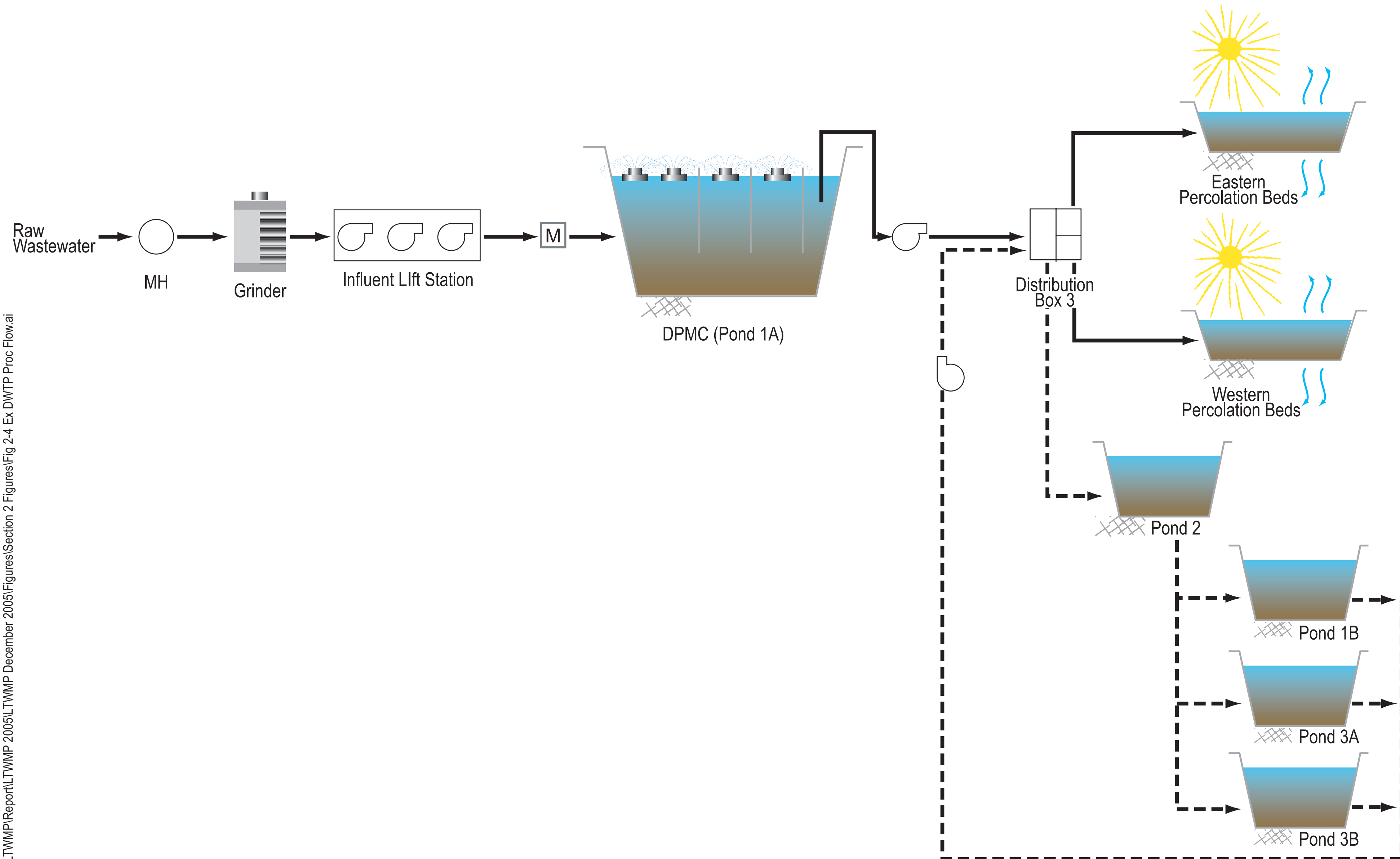

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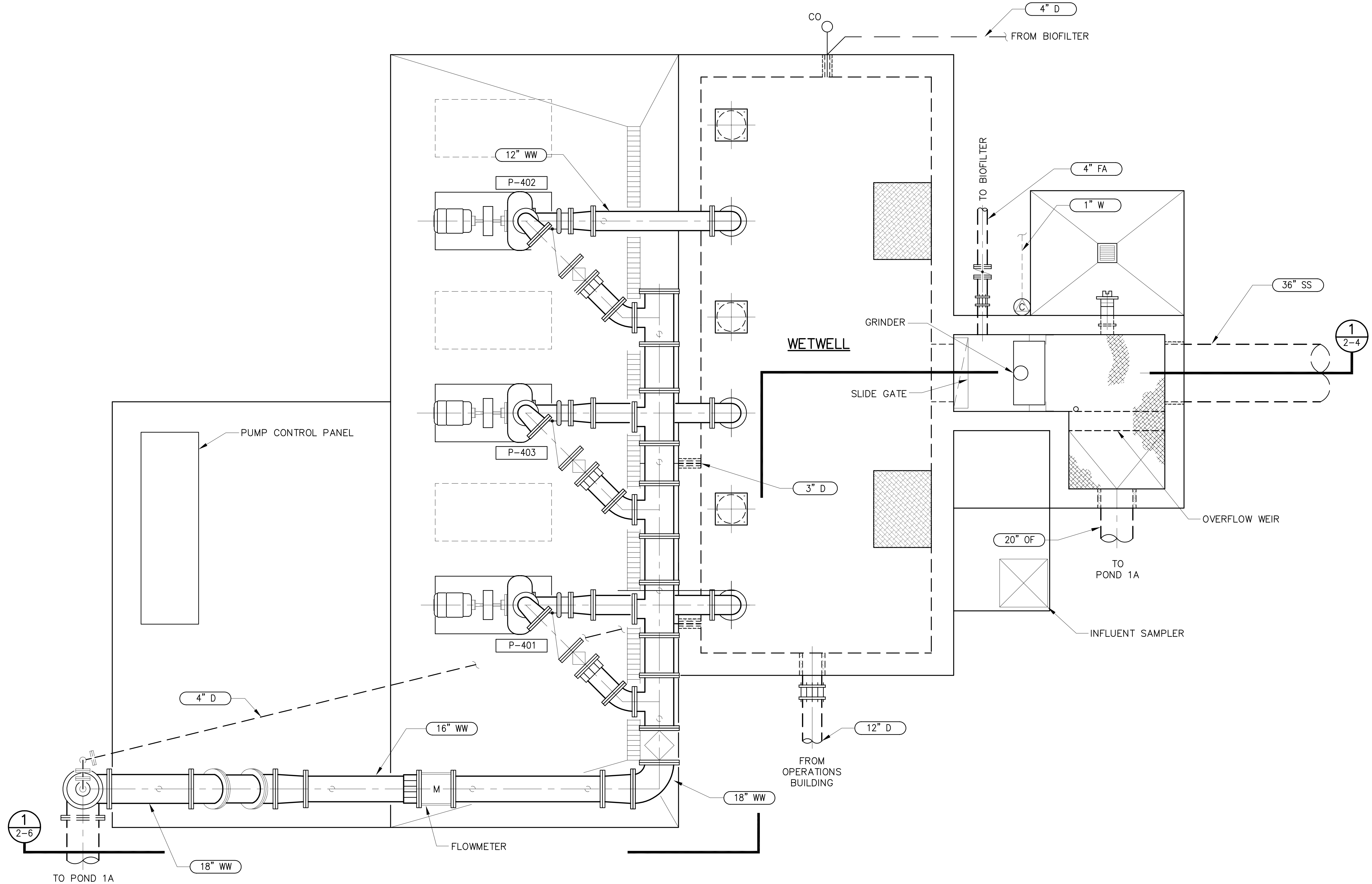
Figure 2-4
City of Hollister Long-Term Wastewater Management Program
DWTP Process Flow Diagram with Interim Improvements



INFLUENT LIFT STATION PLAN

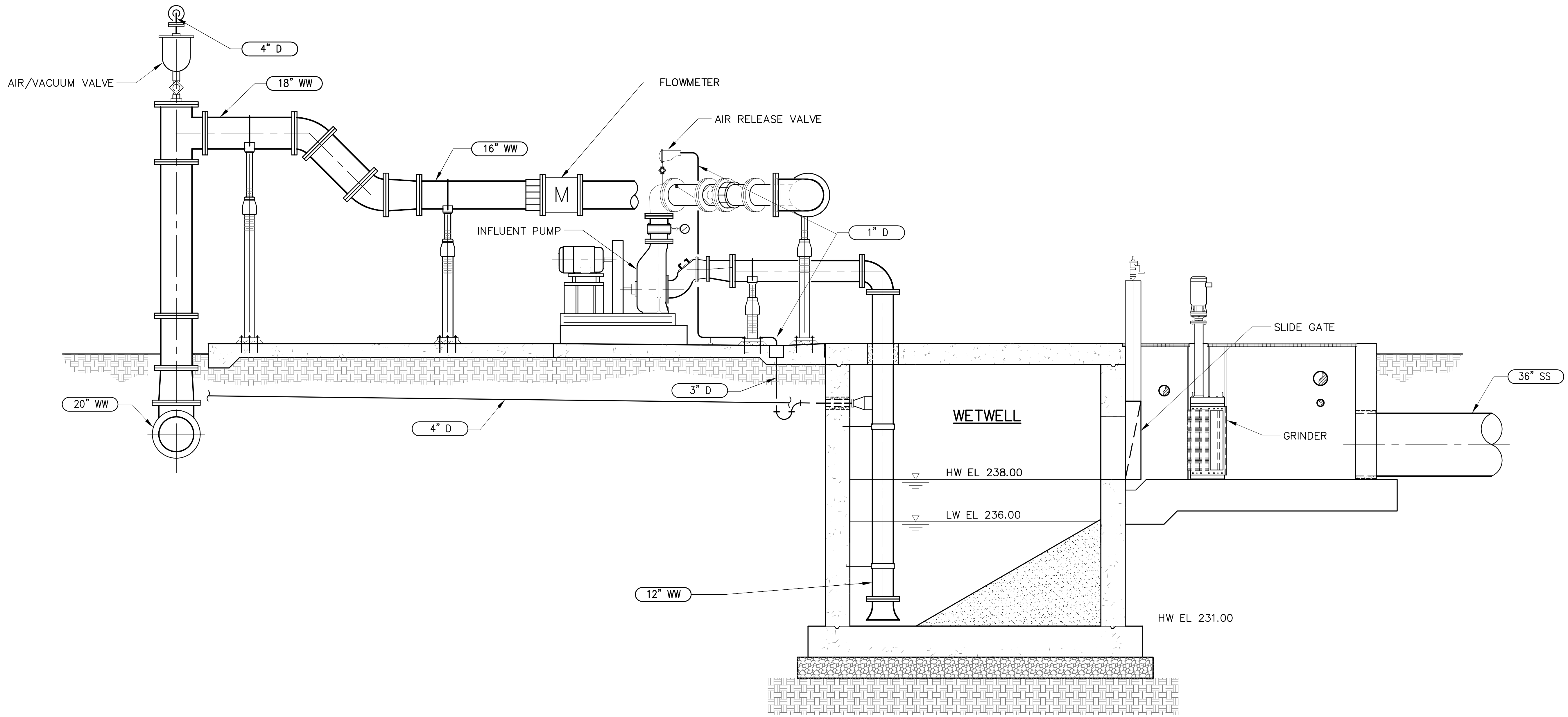
SCALE: 3/16" = 1'-0"

HydroScience Engineers, Inc.

Figure 2-5

City of Hollister Long-Term Wastewater Management Program

DWTP Influent Lift Station Plan



INFLUENT LIFT STATION SECTION 1/2-5

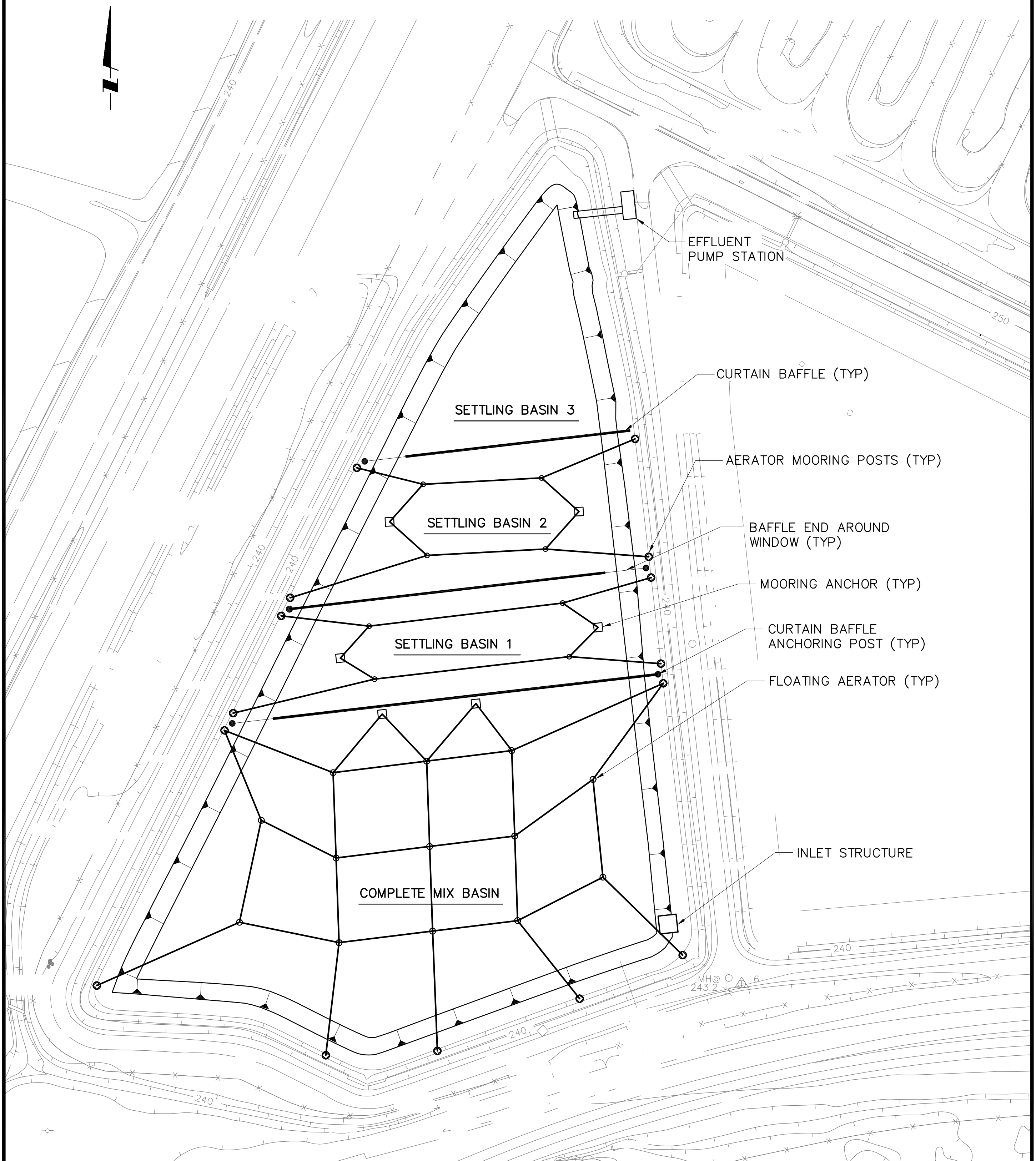
SCALE: 3/16" = 1'-0"

HydroScience Engineers, Inc.

Figure 2-6

City of Hollister Long-Term Wastewater Management Program

DWTP Influent Lift Station Section



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HydroScience Engineers, Inc.

Figure 2-7

City of Hollister Long Term Wastewater Management Program

DPMC Layout Plan

biological treatment for removal of the influent BOD, while the partial-mix basins are used for gravity settling of SS. Compared to the original AIPS design, the DPMC system is able to achieve a higher level of treatment more quickly because biological reactions are no longer limited by the rate of oxygen production from the cultivated algae. Instead, surface aerators totaling 390-hp in the complete mix basin mechanically supply the oxygen necessary to promote BOD uptake.

General design and operational strategy for DPMC systems is similar to other pond-treatment systems – namely, providing sufficient low-powered aeration to achieve BOD reduction. However, unlike conventional ponds that are susceptible to algae growth and blooms, which could impair treatment performance and elevate effluent TSS concentrations, the DPMC system is designed to minimize the potential for algae growth by controlling the basin size and hydraulic detention time (HDT). Specifically, the basins are sized such that the HDT in each cell is shorter than the rate at which significant algae growth can occur.

Pond 1A, which was previously in service as a storage basin, was converted into the DPMC system. Wastewater enters through the southeastern corner of Pond 1A and flows through several separate zones in Pond 1A. As shown in **Figure 2-7**, floating curtain baffles partition the pond into three distinct regions – one complete-mix aeration basin and two partial mix settling basins.

After biological treatment, DPMC effluent is pumped either to the percolation beds for discharge, or, depending on the available discharge capacity, to temporary storage at either Ponds 2, 1B, 3A, or 3B for later discharge. Wastewater is discharged into percolation beds located to the east and west of the main DWTP treatment ponds. The City utilizes 7 beds on the west side of the SR-156 bypass, covering approximately 30 acres, and 8 percolation beds on the east side of the SR-156, covering approximately 25 acres. The 1998 Effluent Handling Capacity Study (Dickson et. al., 1998) estimated the total percolation capacity of the combined east and west percolation beds to be 2.5 MGD. This assessment was based on information from a hydrogeological assessment of the site, plant records, and previous engineering studies (Bracewell Engineering, Inc., 1997). It further assumed the following conditions would apply:

- 0.3 MGD of evaporative and infiltrative losses at the treatment ponds, and
- Near optimum operation of the percolation beds, which would involve frequent dosing to shallow depths and periodic manipulation, such as by disking, harrowing, and/or ripping of the ponds' surfaces.

These percolation beds should be operated in batch mode whereby each pond is loaded, temporarily placed out of service when full, and allowed to dry and rest. Periodically, the surface soil is manipulated with a tractor and disc or harrowed to mix dried algae with the soil to further improve permeability.

Pursuant to the RWQCB's requirements, the capacity of the percolation beds were reevaluated on May 28, 2002, to determine the extent that the percolation rates may have been affected by changes in local DWTP operations, surrounding groundwater management practices, meteorology, and hydrogeology since the 1998 assessment. This desktop evaluation estimated the net percolation bed capacity at 3.5 to 4.0 MGD during the summer and 2.3 to 2.7 MGD during the winter (Schmidt, 2002). Actual operating experience with the percolation beds suggests that the actual percolation rates are even lower (See **Table 8-2**).

However, the City currently treats approximately 2.69 MGD of wastewater at the DWTP and has insufficient capacity in its existing DWTP percolation beds to operate the beds according to this method, especially during the winter months when the capacity of the percolation beds decrease significantly. As a result, the City must divert some domestic wastewater to the IWTP during the winter, as permitted by Order 00-020 and amended by Order No. R3-2005-0142 (**Appendix C**). This will continue until the LTWMP is implemented. The existing percolation beds east and west of the SR-156 bypass are currently in use and will continue to be used. The City disposes of 100% of its effluent through groundwater percolation of treated effluent at the DWTP and at the IWTP. Unit process design criteria for each process after the Interim Treatment Improvements are summarized in **Table 2-1**. A summary of each unit processes' individual capacity is summarized in **Table 2-2**.

Percolation bed capacity is not adequate to meet the City's long-term discharge needs. Additional discharge capacity will need to be added to provide the DWTP with a reliable long-term discharge avenue. Additional effluent management alternatives are discussed and evaluated in **Section 7**.

Table 2-1: DWTP Unit Process Design Criteria after Interim Treatment Improvements[a]

Design Criteria	Design Data
Raw Wastewater	
ADF	2.69 MGD
Peak day flow	4.00 MGD (DPMC design criteria)
BOD	270 mg/L
TSS	315 mg/L
Grinder	
Type	High flow duplex grinder
Number	1
Capacity	8.0 MGD
Power	5 hp
Influent Lift Station	
Pump type	Self priming
Number of pumps	2 VFD 1 constant speed
Capacity	4.0 MGD variable frequency drive (VFD) 4.0 MGD (constant speed)
Size	30 hp
Total dynamic head (TDH)	23-ft
Influent Flow Measurement	
Type	Magnetic flow meter
Number	1
Size	16-inch
Odor Control Biofilter	
Type	Compost media filter
Area	130 sf
Flow	390 cfm
Loading rate	3 cfm/ft^2
Blower operating power	1.58 hp
Blower pressure	10-inch water column
DPMC	
Complete Mix Zone:	
Depth	8 ft
Volume	12.6 MG
HDT at minimum daily flow	6.3 days
HDT at 30-day ADF	4.2 days
HDT at peak daily flow	3.2 days
Total Aeration Horsepower (hp)	390 hp
Aeration hp per MG	45.9 hp/MG
Number of aerators	13
Size of aerators	30 hp
Type of aerators	Floating spray

Design Criteria	Design Data
Partial Mix Zone:	
Depth	8 ft
Volume	8.5 MG
HDT at minimum daily flow	3.4 days
HDT at 30-Day ADF	2.3 days
HDT at peak daily flow	1.7 days
Total aeration hp	40 hp
Aeration hp per MG	4.4 hp/MG
Number of aerators, total	8
Size of aerators	5 hp
Type of aerators	Floating spray
Effluent Lift Station	
Pump type	Self priming, constant speed
Number of pumps	3
Capacity (each)	3.0 MGD
Hp (each)	40 hp
TDH	40-ft
Effluent Flow Measurement	
Type	Magnetic flow meter
Number	1
Size	16-inch
Percolation Beds	
Number	15
Surface area	24.8 acres, net eastern beds 30.7 acres, net western beds

[a] Abstracted from the January 2003, Preliminary Design Report for Interim Improvements at the Hollister DWTP (HydroScience Engineers, 2003a).

Table 2-2: Major Unit Process Capacities after Interim Treatment Improvements (MGD)

Process	Flow criteria	1979 [a, f]	1987 [b, f]	2003
Influent Lift Station	PWWF [c]	–	–	8.00
DPMC Pond 1a	ADF [d]	–	–	3.00
Effluent Lift Station	ADF [c]	–	–	3.00
Lift Station	ADF [d]	1.76	3.30	3.30
Land Discharge	ADF [d]	1.76	3.30	3.50 - 4.00
Land Discharge	AWWF [e]	1.76	4.60	2.30 - 2.70

[a] Original design.
[b] After DWTP upgrade.
[c] Peak wet weather flow (PWWF).
[d] Average dry weather flow.
[e] Average wet weather flow (AWWF).
[f] Abstracted from the 1997 Master Plan Update for the DWTP (Bracewell Engineering, 1997).

2.3. Current Plant Operations

Current treatment and discharge capacity deficiencies at the DWTP (after Interim Improvements) were evaluated. Potential deficiencies in each area are discussed below.

2.3.1. Treatment

There are currently no known performance deficiencies at the DWTP that impair the plant's ability to meet existing WDR conditions. The interim improvements addressed previous treatment deficiencies related to flow measurement, odor control, and mitigation of SS concentration. With the DPMC in operation, BOD and SS concentrations have been reduced consistently below 60 mg/L each, as required by Cease and Desist Order R3-2002-0105 (**Appendix B**).

The interim and long-term improvements are pursuant to California RWQCB Central Coast Region Cease and Desist Order R3-2002-0105 (**Appendix B**), which required implementation of improved treatment and discharge facilities by October 15, 2005 (subsequently revised to December 31, 2007).

2.3.2. Effluent Management

Completion of interim improvements and changes in operations staff have improved and provided more consistent wastewater effluent management at the DWTP. Despite these improvements, hydraulic capacity limitations at the existing eastern and western percolation beds prevent these beds from being capable of meeting the long-term wastewater disposal needs of the City. Disposal capacity to the percolation beds remain at less than 2.69 MGD through much of the year, and temporary diversion of domestic wastewater to the IWTP remains necessary. Diversion was allowed through June 30, 2005 per WDR 00-020. This date was later revised to December 31, 2007. After this date, additional discharge capacity commensurate with the anticipated future wastewater flows is required.

Long-term improvements are required at the DWTP as a result of current treatment and discharge capacity deficiencies. Because the City must have its new DWTP operational by December 31, 2007, it must also have sufficient wastewater effluent management capacity in place at the same time. Long-term effluent management strategies are evaluated in **Section 9**.